CHAPTER 7
HEALTH MANAGEMENT INFORMATION SYSTEM (HMIS)

7 HEALTH MANAGEMENT INFORMATION SYSTEM (HMIS)

7.1 INTRODUCTION

The report is organised into five sections. The first section introduces the reader to health and family welfare in India and presents the setting of the present Reproductive Child Health programme. The second section deals with the HMIS in India and MP and covers their organisation, flow and development. It also discusses the issues with the existing system. The third section deals exclusively with the Vital Statistics System (Population Information System). The fourth section is on Geographical Information Systems (GIS) in health in India and GIS in other sectors. The Appendices provide more details on some of the components presented in brief in the main report.

Health Management Information System (HMIS) – A Brief Overview

Health systems management requires the regular monitoring of the following: the health status of the population; the provision of services in terms of coverage and utility; drugs stocks and consumption patterns; equipment status and availability; finances; and personnel. Such monitoring requires access to timely and accurate information from various sources. Accurate, relevant and up-to-date information is essential to health service managers if they have to identify weaknesses in service provision and take action that will improve service delivery. Accordingly, the development of effective information systems is a necessary precursor to managerial improvement. The interdependence of curative and preventive health is depicted in the diagram below.

A Health Information System (HIS) is a process whereby health data (input) are recorded, stored, retrieved and processed for decision-making (output). Decision-making broadly includes managerial aspects such as the planning, organising and control of health care facilities at the national, state and institution levels. It also includes clinical aspects which can be subdivided into (I) providing optimal patient care, (ii) training of medical personnel to generate appropriate human resources, and (iii) facilitating research and development activities in various fields of medicine.

The term "health management information systems" is generally used to describe the subsystems mentioned in Table 7-1.

Table 7-1 Various Sub-components/Sub-systems of a HMIS

Epidemiological surveillance	Identification/notification of diseases and risk factors, investigation, follow-up, control measures
Routine service reporting	Hospital/health centre-based indicators on performance of the various services
Specific programme reporting	Various programmes in operation in a particular country, topically include: Reproductive child health (RCH) HIV/AIDS Malaria control Tuberculosis control Leprosy control Integrated Child Development Scheme (ICDS), etc.
Administrative systems	Account and financial systems Drugs management (procurement, storage and delivery) Personnel management Asset management (equipment, buildings, etc.) Maintenance system
Vital registration	Birth, deaths, migration, etc.

7.2 HMIS IN INDIA

The necessity of a sound information system as a support to the various developmental activities of the health sector in India was identified as early as the Bhore Committee Report (1943-46). The National Health Policy of India (1983) *inter-alia* states that appropriate decision making and programme planning in the health and related fields are not possible without establishing an effective HMIS and that a nation-wide organisational set-up should be established to procure essential health information, which may provide support for the local management of health care and effective decentralization of activities. The National Health Information Systems provide the inputs in the formulation of regional and global health policies. The call for action to improve the information infrastructure is global, and as early as 1979 an inter-regional consultation on National Health Information Systems was held in Costa Rica on the initiative of the Division of Information Support, World Health Organisation.

Table 7-2 presents a brief outline of the HMIS development in India and the issues at each phase of development.

Table 7-2 A Brief Outline of the Development of the HMIS in India and the Major Issues

Year/Event	Content	Issues
1972	Efforts made to introduce "Integrated Management Information and Evaluation System" by Central Bureau of Health Intelligence.	The scheme could not get started. Each state followed its own formats of reporting.
1982	Efforts made to introduce a Management Information and Evaluation System (MIES).	
1983	National Health Policy envisaged a nation-wide organisational set-up to procure essential health information	
1983-85	HMIS version 1.0 in four participating states of Gujarat, Haryana, Maharashtra and Rajasthan	First efforts to develop standardised formats, registers and reports to be used by SC, PHC and the district.
1986-88	Development of HMIS 2.0 through the support/collaboration of WHO and National Informatics Center (NIC). 1989 - Field testing of the HMIS in one district each of Gujarat, Haryana, Maharashtra and Rajasthan 1990-95 - Implementation efforts in 13 states and Union Territories in a phased manner	First computer compatible system. The data is fed at the district NIC computers, usually located in the collector's offices. Then the data travels to Delhi for consolidation and report preparation. All the efforts in the earlier efforts were aimed at developing elaborate registers, lengthy reporting formats for each vertical programme. Formalism in transmitting the reports to the higher levels was the norm. The system suffered inadequate implementation, as there was apathy from the users at all levels to demand, validate and utilise information for decision-making and feedback. Unequipped and ill funded CBHI could not give direction and support to this Herculean task. The system developed is largely paper based and based on aggregate data reaching higher levels.
1998-1999 RCH programme	Facilities survey and rapid household surveys in all districts as part of building up HMIS in RCH programme by government of India.	The surveys were mostly done through third party consultants. Valuable data was collected but most of the states received the reports very late. The report is again in black and white, and no database was developed nor shared with the state governments, who are the real users of the information.
	A Community Needs Assessment (CNA) was introduced whereby a set of action plans are prepared in the beginning of the year and performance reports are received every month from each institution, consolidated at the district and transmitted through NICNET.	CNA system has many limitations, the most important being unreliable and *ad hoc* action plan preparation from SC to district level. Unreliable data and absence of feedback accentuates the problem further.

7.2.1 Organisational Arrangements for the HMIS in India

The organisational arrangement of HMIS, the agencies responsible for it at the three levels, namely central, state and district, and personnel involved have been listed in table 7-3.

In the following pages a detailed description of the key institution/person is given.

Table 7-3 Organisation/Person Responsible For HMIS Matrix

Location/hospital	Person responsible
Central Government	
	Central Bureau of Health Intelligence
	Statistics Division- Department of Family Welfare
	DGHS – Rural Health Statistics Section[1]
	Statistics Division- Department of Health
	Sample registration system- headquarters
	National Informatics Center
	Registrar General Census
	National Sample Survey Organization (NSSO)
	National Surveys
	National Family Health Survey (NFHS)
	Rapid Household Survey
Madhya Pradesh Government	
State	Dy Director Demography
	Dy Director Planning (at present vacant)
	Dy Director Disease Surveillance
	Dy Director (Dy registrar general) Vital statistics (Department of Economics and Statistics)
	Joint Director (Census Commissionerate -Sample Registration System)
District	District Asst. statistical officer (ASO),
	Information assistant
	ASOs for the following programmes
	TB,
	Blindness control,
	Leprosy control
PHC/Hospital	Computor [2]
	Pharmacist (for OP Statistics, Stock position)
	Non- Medical Assistant (Leprosy statistics)
	Lab- assistant (malaria statistics)
	Block Extension Educator (IEC)
SC	Auxiliary Nurse Midwife/MPW (male/female)

(1) Central level (Government of India)

At the central (Government of India) level there are four major agencies dealing with the HMIS.

[1] Published in the Rural Health Statistics bulletin.
[2] Designation of statistical assistant who is responsible for the overall reports (spelled wrongly as computer)

1) Central Bureau of Health Intelligence (CBHI)

The CBHI (a brief fact sheet is given in Table7-4) and Organogram is given in Figure 7-1 is the health intelligence wing of the Director General of Health Services (DGHS)

At the national level, it is the main organisation which deals with the collection, compilation, analysis and dissemination of information on the health conditions in the country, covering various aspects of health, including health status, health resources, utilisation of health facilities, etc.

Table 7-4 Fact Sheet

Located in	Delhi
Computers	2 old PC AT machines and couple of Pentiums
Telephones and faxes	Two lines
Networks	No network
Budgets	Mostly for the staff component
Staff	4 technical staff and the rest general staff

2) Statistics Division in the Department of Health and Family Welfare

The division is well staffed with a chief director and four joint directors. It is organised into a computer unit, demography unit, performance monitoring, evaluation unit, and impact-monitoring unit. The impact-monitoring unit is further divided into the field evaluation unit and the concurrent evaluation unit. Since this division is physically located in the Health Ministry, it has access to better computing facilities and office support. As there is a greater thrust on the RCH programme, continuous funding is assured for its surveys and studies. The personnel are exposed to statistical techniques and survey methodologies. It brings out various publications periodically, like a *Monthly bulletin on family welfare statistics* and a *Yearbook on the family welfare programme in India*.

3) The Sample Registration System (SRS)

India conducts census operations once in every ten years. In between, the estimates of vital statistics are based on a system called Sample Registration System (SRS). SRS is a large-scale demographic survey conducted in India for providing reliable annual estimates of the birth rate, death rate, and other fertility and mortality indicators at the national and sub-national levels. The field investigation consists of continuous enumeration of births and deaths by a resident part-time enumerator, generally a teacher, followed by an independent survey every six months by an official. The data obtained through these operations are matched. The unmatched and partially matched events are verified in the field, and thereafter an unduplicated count of births and deaths is obtained.

The SRS was initiated by the Office of the Registrar General, India on a pilot basis in a few selected states in 1964-65. It became fully operational during 1969-70, covering about 3700 sample units. Thereafter the sample size has been periodically increased. The frame was recently updated based on the 1991 census data. The Director of census operations in each state administers the SRS.

The sample unit in rural areas is a village or a segment of it, if the village has a population of 1500 or more. In urban areas the sample unit is a census enumeration block with a population ranging from 750 to 1000. At present, SRS covers 6671 sample units (4436 rural and 2235

urban) in all the states and union territories of India, covering 1.1 million households and a population of about 6 million. Figure 7-1 depicts the flow of the SRS information.

Table 7-5 Sample Registration System (SRS)

Information Captured by SRS	Reports Generated
▪ Household data	▪ Composition of population
▪ Births – method of delivery, weight, etc.	▪ Fertility indicators
▪ Deaths – Cause of death etc.	▪ Mortality indicators
▪ Age at Marriage	

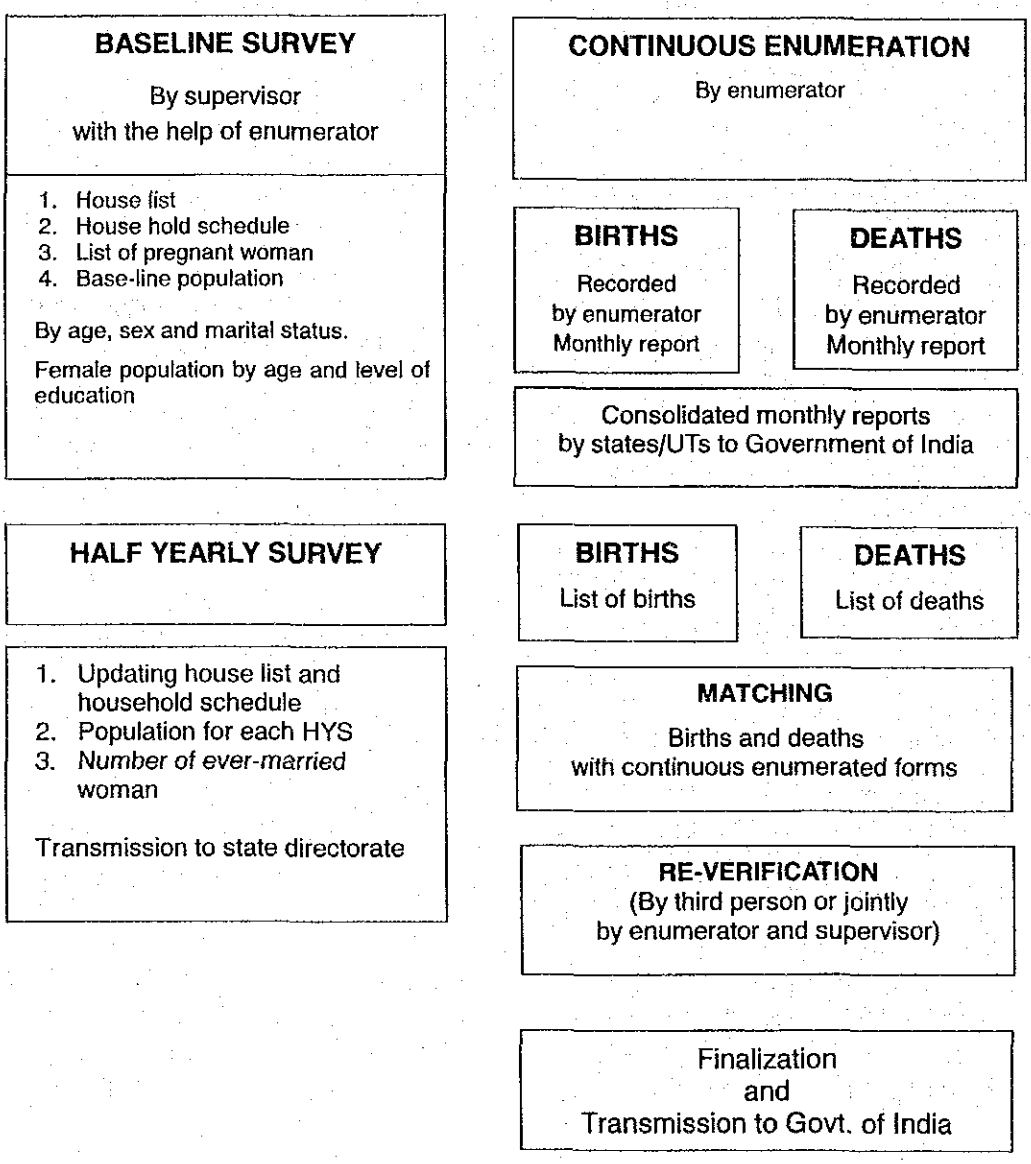

Figure 7-1 Flow of Sample Registration System (SRS)

4) National Informatics Centre (NIC)

The government of India has set up the NIC to promote an informatics culture in the government departments and develop computer-based decision support at various levels. NIC has set up a nation-wide satellite-based computer communication network (NICNET) covering all the districts, state capitals, and the centre in order to facilitate the district information system (DISNIC) at the district level and essential databases for the state and central government departments.

NIC's district nodes are usually located in the district collector's office and carry out most of the district data entry operations at the district level.

5) National Sample Survey Organisation (NSSO)

NSSO was set up in 1950 with a programme of conducting large scale surveys to provide data for estimation of national income and related aggregates, especially for the unorganised sectors of the economy and for planning and policy formulation. The subjects covered include socio-economic indicators of consumer expenditure, prices, employment, land holding, livestock, etc. It conducts an economic census every 10 years to coincide with the population census.

6) Census

The Indian Census is the largest single source of statistics on the people of India. With a history of more than 125 years, this reliable, time-tested exercise has been the source of a wealth of statistics every 10 years beginning in 1872 when the first census was conducted in India non-synchronously in different parts of the country.

The last or just concluded population Census of India was scheduled from the 9th to 28th February 2001, and the reference Census moment indicating the population of the country was 0.00 hrs of 1st March 2001.

The information garnered is vast and includes:

- Socio-economic details
- Demographic details
- Household information

Apart from the regular institutional arrangements for the Population and Health data collection, there are a couple of important surveys conducted at sufficient intervals, which generate very useful data for planning and monitoring. The National Family Health Survey (NFHS) is one of the important surveys conducted every five years.

7) National Family Health Survey (NFHS)[1]

The NFHS funded by USAID was conducted in two rounds (1992-93, 1998-99). The objective of these studies is to provide state and national estimates of fertility, the practice of family planning, infant and child mortality, maternal and child health, and the utilisation of the health service provided to mothers and children. In addition, the survey provides indicators of the quality of health and family welfare services, woman's reproductive health problems, and domestic violence. It also includes information on the status of woman and the standard of living.

[1] These are central-level surveys conducted throughout the national level and hence included in this section.

The data is designed to strengthen the database of all the above indicators and facilitate implementation of population and family planning programmes in the country. The NFHS 2nd round has covered nearly 90,000 eligible women in the 26 states of the country.

The study is very well structured and implemented with fairly good accuracy of the estimates, but the indicators are of the state and national level. It may be noted that the interregional differences are very significant in the country and each state has large variations among different districts[1]. Therefore the study data and findings do not help district level planning.

8) Rapid Household Survey and Facility Survey

The RCH programme requires decentralization of planning, monitoring and evaluation of services. With such objectives, the GOI has been interested in generating district-level data on facilities, indicators of utilisation of services, quality of services, clients perception of the services, etc. Since the existing HMIS is very weak (in any case, it doesn't cover quality of services and perception of clients on services) and not timely, GOI decided to launch surveys throughout the country through third party consultants.

Towards achieving its goals, it has launched two national level surveys and completed the first round of data collection and report preparation.

- Rapid household survey (a sample of 1000 for each district)
- Facilities survey (all facilities PHC and above)

7.2.2 Organisation of HMIS in MP

(1) Department of Public Health and Family Welfare (DPHFW)

Two state level officers are responsible for the HMIS in MP, i.e., the Deputy Director, Demography (in Family Welfare) and the Joint and Deputy Director, Planning (Health). A comprehensive organogram mapping the key decision makers and availability and usage of the computers is provided (Figure 7-2 on next page). At present, the position of the Deputy Director Planning is vacant so is that of the statistical officer planning, who is his deputy. The Deputy Director, Demography is helped by 5 investigators (data entry operators) (see Table 7-6), and he is at present in charge of the computer centre in the Department of Public Health and Family Welfare.

Table 7-6 Present strength of state Demography and Evaluation Cell

Position	Sanctioned	In position	Vacant
State Demographer	1	1	0
Statistical officer	2	0	2
Asst. Statistical Officer	1	0	1
Investigators	22	7	15
Lower Division Clerk	1	0	1

[1] For example the % of children with complete immunization is 90.4% in Balaghat, it is 17.3 in Tikamgarh. Similarly the % age of females with RTI/STI symptoms is 42.3 in Chhatarpur it is 4.4 in Gwalior.

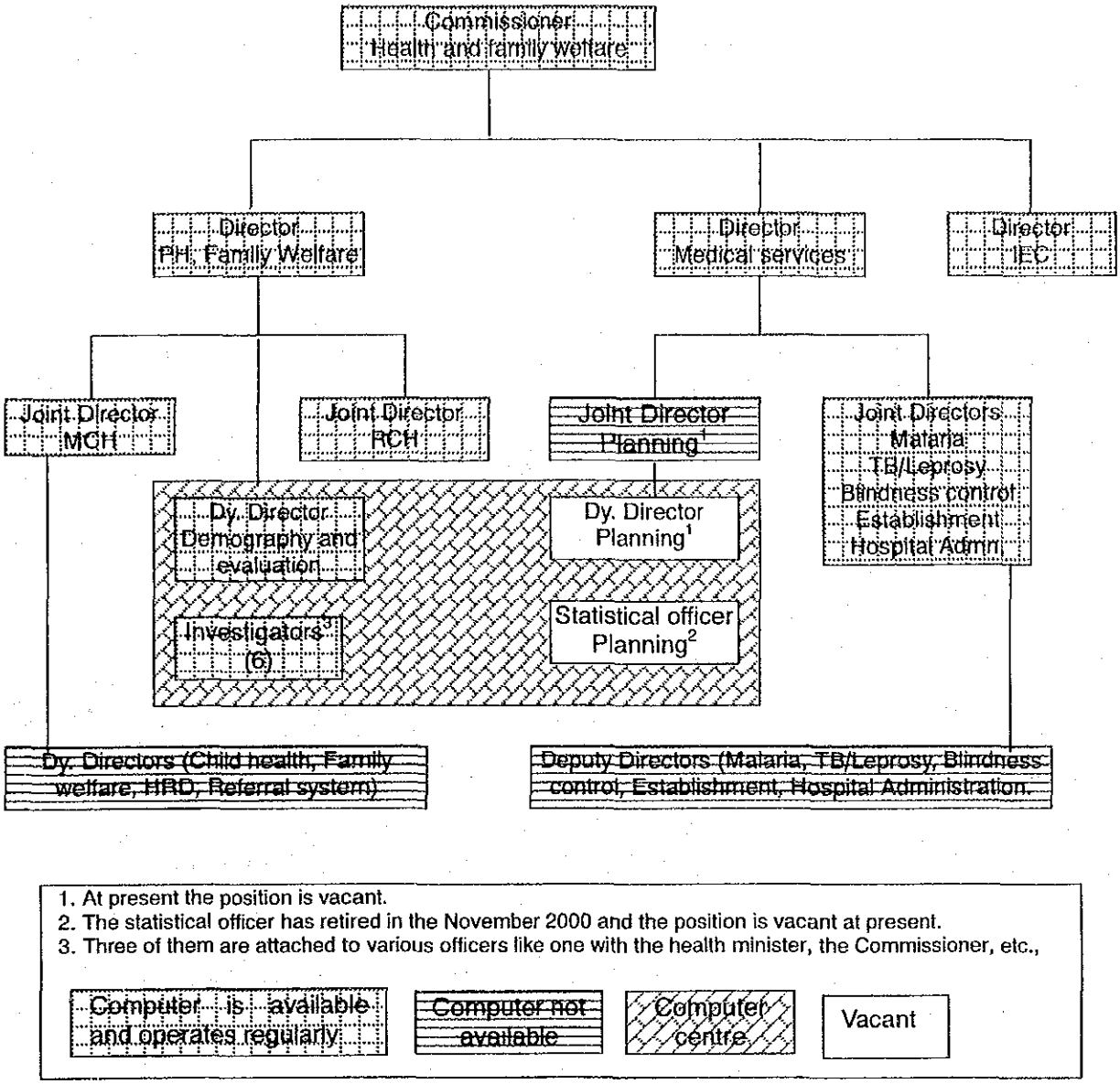

Figure 7-2 Organogram of the Key Decision Maker, Availability and Usage of the Computer

(2) At the district Level

At the district level there is one Assistant Statistical Officer (ASO) reporting to the Chief Medical & Health Officer. He mostly looks after the family welfare statistics (RCH). There are 3 more ASOs in each control programme --TB, Blindness control, Leprosy -- but only half the districts have the posts sanctioned. They are assisted by one clerk/LDC each. Figure 7-3 maps the position of the district health information channels.

Most of the districts (around 40) have a position called Informatics Assistant. This position was provided a computer in the year 1997-98. It has been a unique scheme and the personnel are deputed from the MP Oil Federation Corporation. Most of them are qualified postgraduates. But

since there has been inadequate guidance on developing databases and other usable statistical and monitoring aids, their functions were restricted to developing payroll and word processing applications.

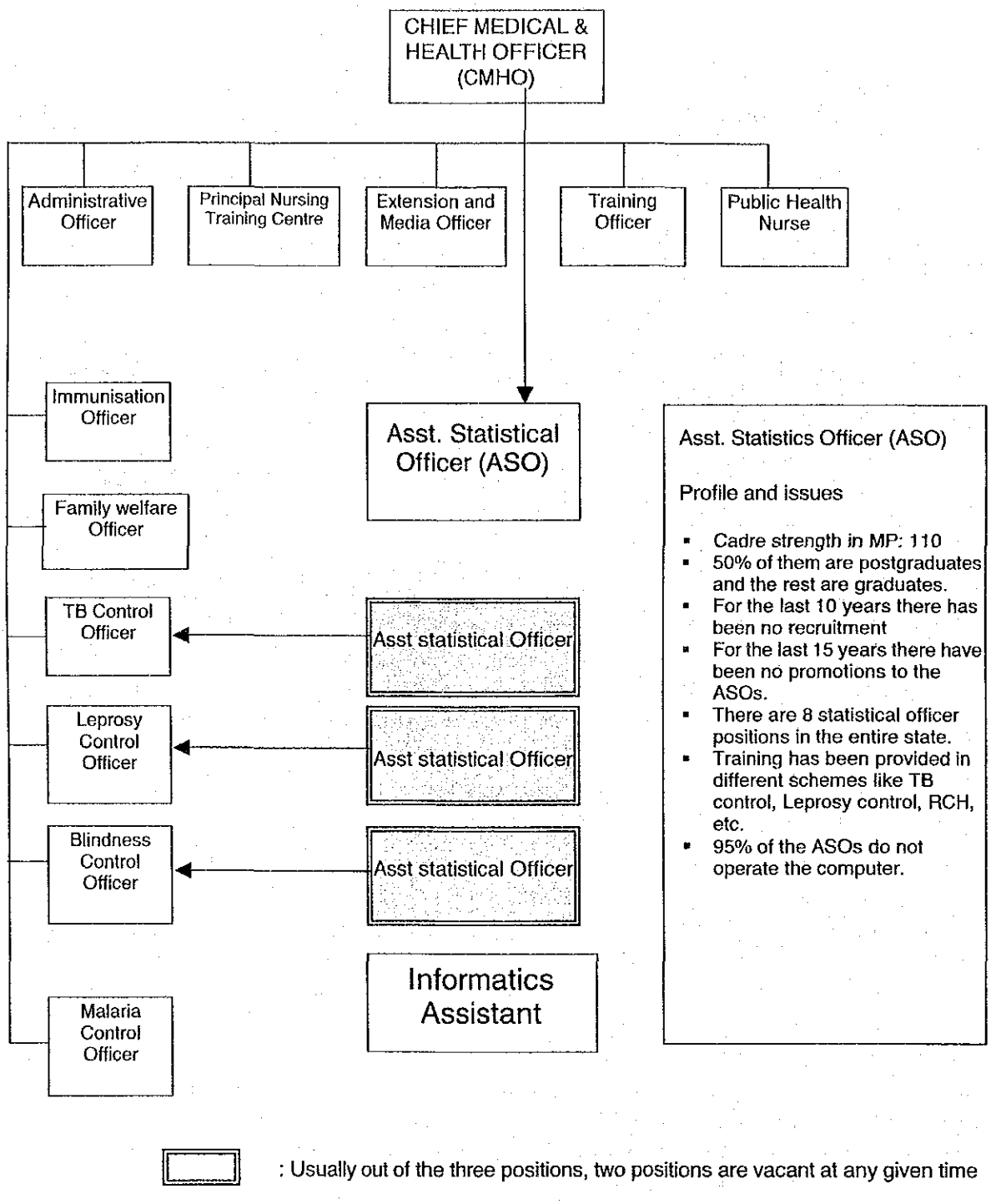

Figure 7-3 Organogram of the Position of the District Health Information Channels

(3) At the PHC Level

Every PHC has one position designated as "Computer" (not the computer machine) who is exclusively meant for the compilation of all the reports at the PHC level. Most of the computers are graduates and have been recruited in 1975. The PHC has various functionaries, such as pharmacist (for OP statistics, stock position), non- medical assistant (leprosy statistics), lab-assistant (malaria statistics), and block extension educator (IEC). They prepare their component reports. But the Computer is responsible for the overall compilation and timeliness of the reports.

(4) At the Sub-Centre (SC) Level

The Multi Purpose Worker (MPW) (male and female) and ANM are responsible for the maintenance of the registers and the preparation of the reports.

Content And Flow of HMIS

The following pages detail the content and flow of HMIS, information requirements of the health planners, existing and available information, and efforts at developing the HMIS.

Table 7-7 explains the content of the information flow from the lower level to the higher levels.

Table 7-7 Content and Flow of HMIS at a Glance

From –To	Periodicity	Content	Comment
Sub-centre to PHC	Monthly	Performance report – a very exhaustive report on all aspects of performance. Family planning, immunisation, diarrhoeal diseases, malaria, leprosy, blindness, deaths of all types Inventory report – malaria drugs, family planning, vaccines, ORS, basic drugs and others. A column on consumption, balance and whether it is sufficient or not is included	The name of the various reports are CNA action plans, monthly performance, etc.
	Others	Basic equipment facilities – quarterly (Lists 20 basic equipment and their working status)	
PHC / hospital to District	Monthly	Family welfare—sterilizations, IUDs, Oral Pills, Condom users, Medical Termination of Pregnancy, etc., stock position and the details of the above-staff wise and unit wise etc. Vital statistics- births, stillbirths, deaths, maternal deaths, infant deaths, neo-natal deaths Family Welfare performance – antenatal cases, institutional deliveries, vaccination, cold chain equipment, surveillance on diphtheria, measles, etc. Medical intelligence data - identified diseases from general fever to ulcers of the stomach and snake bites Hospital inpatient and outpatient IEC reports on contacts, group activities T.B., malaria, leprosy monthly reports.	Summaries of particular block PHCs only.
District to state HQ	Monthly	Malaria, TB, leprosy, blindness, etc. Each programme sends a summary of programme statistics. Summary statistics for family welfare services (CNA under RCH).	CNA reports are directly sent through the NICNET to the central government.
State HQ to centre	Monthly	Malaria, TB, leprosy, blindness, etc. Each programme sends a summary of programme statistics. Summary statistics for family welfare services (CNA under RCH).	

7.2.3 Community Needs Assessment System (CNA)

The CNA approach (CNAA) was launched as an integral part of the RCH programme in October 1997. CNAA is structured through the transmission of action plans and reports in nine formats: action plans - Form no, 1 to 5 and monthly reports - Form no. 6 to 9. The figure 7-4 provides the details of each form and submission process.

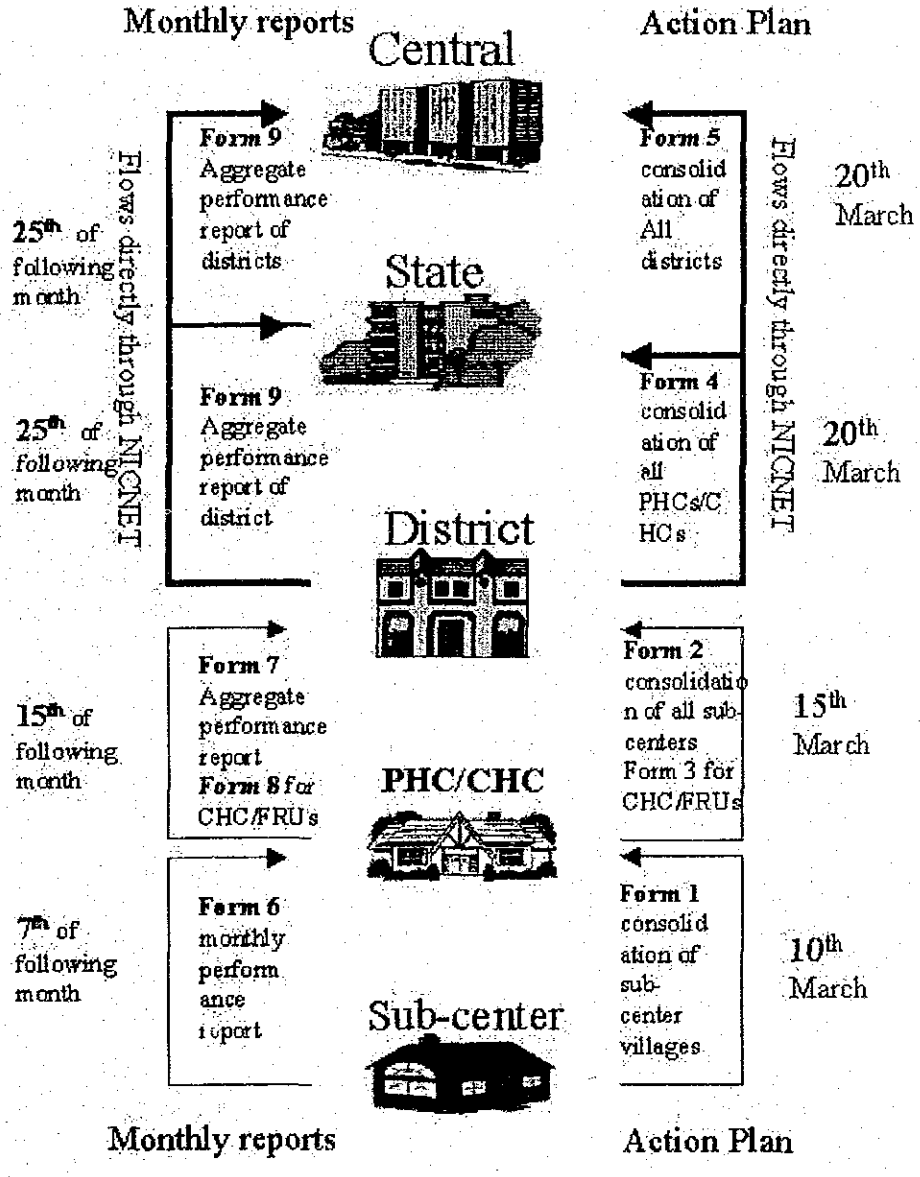

Figure 7-4 Diagram of CAN System

Table 7-8 DPHFW Information Requirements at Different Levels for Decision-making

Level/ location	Information required for planning and monitoring	Availability	Comments/issues
State level	Facilities information (type, size, location, buildings, etc.)	No	Complete information is available at the district level only
	Personnel information including deployment at various institutions	No	Only state cadre officers' information is available.
	Performance of different programmes	Partial	District-level summaries are available.
	Inventory details	No	District and each institution have the data.
	Equipment details (Brand, manufacturer, value, life, etc.)	No	District and each institution have the data
	Hospital statistics (OP, IP, surgeries by type, etc.)	Partial	District-level summaries are available
	Vital statistics	Partial	Bureau of Economics handles the birth and death registration. The compilation process is very slow and incomplete.
District level	Facilities information (type, size, location, buildings, etc.) Personnel information including deployment at various institutions Different programmes' performance Financial planning – budget details Inventory of drugs, vaccines, and consumables Vital statistics	Partial	It is available in different registers with various personnel and different sections. Mostly manual methods of record keeping. No formal interactions with Woman and Child dept. and Statistical Office (for vital statistics).
	Performance of other districts in the programmes	Not available.	This is very crucial and the state government does not usually supply the information
Primary Health Centre/ Community Health Centre/ Hospital	Information regarding the villages Staff deployment Programme-wise details Inventory details Drugs, consumables, and vaccines Vital statistics	Partial	The information is available with various functionaries (incompletely). It is not comprehensively available to the medical officer.
	Performance of other PHCs in the block and district	Not available	District does not usually supply this information.
SC	Household information	Partial	Though the information is not 100% and total, it is mostly available (for someone who stays in the village and works)
	Eligible couples	Partial	
	Antenatal women	Partial	
	Immunisation status	Partial	
	Inventory status	Yes	
	Performance of other SCs in the PHC area	Not available	

7.2.4 Efforts to Computerise the HMIS

The DPHFW of the MP government from time to time has tried to computerise the HMIS and improve the availability of health information to the planners and policy makers. It has sought the services of the MP Oil Federation for the computer personnel, who have been deputed to the Health department in large numbers. Table 7-9 details the efforts to computerise, the present status, and the issues faced. Table 7-10 lists the computer personnel available and the strengths and weakness of the computer centre. Table 7-11 describes the availability of hardware in the DPHFW.

Table 7-9 Previous Efforts at HMIS and Related Software Development

Sr. no.	Software (both administrative and health related)	Comments
1	Payroll of headquarters staff	Presently working and reliable
2	Drugs management system	Partially developed but abandoned later
3	Budget and expenditure database	Partially developed and given up now
4	Health personnel database	Recently (2000 December) developed for the allocation of staff to Chhattisgarh and has limited information. The database is limited to state cadre officers only. Presently being updated.
5	Health facilities	Basic information available in separate excel sheets
6	Equipment management	Software developed, but given up now

Issues:

The software development had been undertaken under various programmes. Usually the first version or prototype is developed (mostly through outside vendors) and after that the data entry problems or validation problems crop up. In case of old personnel information system, they failed to update it regularly. Many times mismatches developed as the staff transferred would not join the duties and continue in the same place, resulting in wrong entries in the database. Most of the development efforts lacked proper planning, underestimated the complexity involved and the need for adopting a systematic methodology. Finally the Dy. Director of the computer centre has been transferred to the Chhattisgarh state. Dy. Director demography now is in charge of the computer centre.

Table 7-10 DPHFW Computer Centre
Qualification of the Personnel and Future Potential

Person	Qualification	Knowledge	Comments
Investigator -1	M.Com, PGDCA	Hardware and networking	Most of them are highly qualified. They are on deputation from the MP Oil Federation. They have not received any training in the Health department. They have been allocated *ad hoc* to various officers and usually assigned to data entry and word processing tasks. Most of them have long tenures (5 to 8 years) in the health department and are conversant with the terminology and health service delivery mechanisms. They need proper reorientation, training, regular guidance, probably redesignation as programmers/systems analysts, etc., They need to be isolated from word processing and data entry jobs.
Investigator -2	M.Com, PGDCA	MS- office and + database	
Investigator -3	BSc, PGDCA	Visual Basic	
Investigator -4	BSc, MCA (final)	MS Access	
Investigator -5, 6, 7	-----	----	

Table 7-11 DPHFW - Computers Obtained in Various Programmes

No. of Computers	Configuration	Scheme/programme	Remarks
4 computers	386 DX	IPP-VI	All of them are condemned, except one that is put to payroll use.
7 computers with printers and voltage stabilisers	300 Pentium	RCH	Being put to use.
Compaq server	------	UNICEF border districts programme	Received one year ago, but the box is not opened yet as the operating system is not available.
4 Computers (1 each programme)		Blindness Control Programme, TB, State illness fund, European Commission Programme	Being put to use.

(1) Computerisation Efforts at the District Level and Below

Some districts (35) where computers have been supplied and informatics assistants posted have implemented some low-end computing applications like paying bills for the entire staff of the district. Earlier, as part of the state-wide drive to computerise the information on government employees, health staff information was also computerised with minimal data. Since it has not been updated, the reliability of the data is very low. Some districts have developed a list of PHCs and SCs with the names of the personal posted at that particular unit. There are no computers below the district level. Table 7-12 outlines the availability of computers and personnel in the Sagar division.

Table 7-12 Availability of Computers and Operators in Sagar Division

District	Computer	Operator	Remarks
Sagar	Yes	Yes	Old 386 computer which is being put to use for paying bills of staff and other miscellaneous word processing
Damoh	Yes	Yes	Old 386 computer which is being put to use for paying bills of staff and other miscellaneous word processing
Chhatarpur	Yes	Yes	--
Panna	No	No	Computer will be provided in the current year
Tikamgarh	No	No	Computer will be provided in the current year

Recent developments in improving the collection and availability of health information – State-wide Household survey

The state government under the community-centred Rajeev Gandhi Mission for providing basic health services in every village of the state, launched a major household survey in February 2001. The survey sought to identify the health-related problems in each village and promote hygiene and health awareness. With the help of a questionnaire, an effort was made to map the health problems. As for the follow-up, a village level health register will be maintained and the data from the register will be used to prepare the district plan. It will also map the availability of trained and untrained health workers at the village level.

The central database at the district will have to be supported by a good level of computerisation. It is manually impossible to maintain the data of nearly 1 million people in each district. Practicality demands that the old system of collecting aggregates be abandoned and that the survey data be made available to the district level officers with all the household level details in a database format.

MP has a large number of donors and major NGOs working in the health sector. They too face the difficult situation of collecting and validating health information. Some of them depend on the Department of Public Health and Family Welfare and others develop their own system. Some of them use computers extensively. Table 7-13 explains these developments in brief.

Table 7-13 Usage and Development Strategies of Donors and Major NGOs in MP

Agency	Project/coverage	HMIS Strategy/plans	Comments
DANIDA	The project management unit functions to support government on policy making and strengthening through studies, co-ordination with other donor agencies. The main components identified for strengthening are IEC, HMIS, Dai training, etc.	HMIS plans include supporting the government efforts through a funding technical consultant. They are going to conduct a feasibility study on the introduction of a simple and integrated HMIS system. The developed system will be piloted in one district and then extended to the whole state.	The state govt. may accept the suggestions, but the mandatory reporting in the RCH programme under the CNA system has to be followed as per the Government of India guidelines.
UNICEF	UNICEF operates in the state in all areas of woman and child development through nearly nine support schemes. Total funding available each year is around 0.7 million US$.	UNICEF uses the internally developed "ChildInfo" as a database on indicators related to nutrition and has expanded to include over 100 indicators on women and children. The database developed by UNICEF has simple tools to link with features that allow users to easily make Tables, graphs, and maps based on the data without having to learn any mapping technology. Graphs and maps on a variety of indicators can be developed by users with average computer literacy in minutes and can be directly imported into documents, reports, and presentations. The database for India has indicators and mapping facility down to the district level.	Very useful initiative. But the indicators are obtained from the government statistics and many times are of doubtful validity.
UNFPA	The programme is in operation in five border districts with nearly 32 crores funding for 5 years. The project aims to reduce the TFR and STDs, and increase the CPR and AIDS awareness. It has components for building repairs, training, equipment, and IEC activities.	Developing a surveillance system, which monitors crime/violence against women. It will operate through the police stations, NGOs, family counsellors. The programme strengthens the police station documentation system.	Very useful for the Woman and Social Welfare Departments. It may take 2 years before it stabilises and gives reliable information.

Agency	Project/coverage	HMIS Strategy/plans	Comments
CARE	The project is in operation in 3 districts of MP.	Extensive MIS system in place with high level of computerisation. Basic GIS system (EPIMAP) is being used. There are plans to link the districts with the VSAT terminal for online updating. There are computers at the block level, which are used to generate databases.	The linkage with the govt. in terms of feedback and regular exchange of information in database formats is weak. Interacts mostly with the Woman and Child Department.
UNDP	UNDP, along with the Department of Science & Technology, is supporting a 3-year project. Under the project the development of the blocks is envisaged through the proper application of science and technological interventions.	They have conducted household surveys in the project blocks and developed very good databases. At present they are digitising the village level information in the selected blocks for GIS development.	Information on many economic and social indicators is available for selected blocks. Useful for micro-planning at the Panchayat and block level.

7.2.5 Issues with the HMIS

The following pages detail the issues relating to the structure, process, and content of the HMIS. Some discussion of the issues with the central agencies has been added for the better understanding of the scenario. The suggestions in the later pages will pertain to the system in MP, state level, district and levels below. (It is beyond the scope of this project and that of the MP Government to address the issues with the central agencies.)

(1) Issues with the Central Agencies

1) Central Bureau of Health Intelligence (CBHI)

The CBHI is a compact organisation with minimal staff. The main issue worrying them is that of inadequate computing facilities. Presently, they are relocated in an area of Delhi where sometimes the power supply fails for days together. The old computers cannot run the latest software and packages. They do not have programmers and have to depend on the National Informatics Centre (NIC) (Govt. of India computing wing) for programming help. Further, there is very little focus on human resource development in the CBHI. Training for the development of the latest skills is limited. The staffs are hardly ever sent for external training on computing and database technologies.

2) Sample Registration System (SRS)

The SRS is a sample survey and the sample units are less than 1 percent of the habitation units (300 rural and 100 urban sample units for 71,526 villages and 465 towns in undivided MP).

Only state-level estimates are available. One indicator for a population of 50 to 100 million cannot be employed for focused attention. This means that the interregional differences and the enormous differences between the different districts are omitted. To this extent, it does not help focused planning and monitoring efforts (for example birth rate in Gwalior district is 34.7 and IMR 70, Balaghat 30.8 and 110, Betul 38 and 128 respectively. Source: 1991 census)

Even the SRS, which started as a stop-gap arrangement in the civil registration system, is not up-to-date and its reports are quite delayed and face the same situation as the census. The reports are delayed on an average by two years and the publications are delayed for a still longer period (at present 1998 the October bulletin is the latest available).

3) National Informatics Centre (NIC)

NIC operates with outdated systems, procedures, and software. Usually, the systems available at the districts are very old and run on the UNIX operating system. The data link has only 2.4 KBS speed. They have not addressed core issue of developing sortable and queriable databases.

4) Census

The census, being conducted only once in ten years, is not a very valid tool for making mid-term estimates. Even the district indicators and Tables are made available for general usage only much later after the census has been conducted. In the absence of a reliable and complete vital statistics system, the census often is the only source available at the district level for demographic and other estimates.

(2) Issues with the CNA system

1) Complex process

The SC (Sub-centre) ANM on average has 4 ~ 6 villages to cover and has to consult members of Panchayat Raj Institutions (PRI), Anganwadi, and Mahila Swastya Samiti (MSS) in each village. Thus the ANM has to work out the needs of each village separately and has to consolidate the information into FORM 1. But the process of eliciting the opinions of these other involved people has not been developed. Formats for enlisting the opinion of the opinion makers and social leaders in the village are not available. Only 15 days have been earmarked for the survey, which is too short a period, and it is almost impossible for anyone to cover nearly 1000 families in 4 ~ 7 villages in that time.

A lot of numerical calculation has to be done in the action plan for the SC (of the 23 points except for 11, 12, 22, 23 the rest have to be calculated). If the SC action plan has to be formulated on the basis of calculations, it can be done better and more easily at the district level after obtaining the base information from the SC.

2) Miscellaneous issues with the CNA system

Shortage of stationery: Form 1 has to be prepared in three sets by ANM, but only one form is available.

There is no provision/form for a sector action plan. (Now they have adopted the SC form, i.e., Form 1).

3) *Weak district-level organisation*

The ASO, the incumbent responsible for the HMIS, is under-trained, unequipped, and under-assisted. He has hardly any equipment more than a calculator. Most of the time he develops his own registers from the general stationery.

The other ASO positions in the various programmes are not filled in more than half the districts. In Tikamgarh, one ASO position is filled against the four required under the TB, Leprosy, and Blindness control programmes. In the absence of the regular ASOs, clerks or office assistants

handle the statistics function. The main load falls on the general ASO, who has to do the routine reporting of immunisation, family welfare, and hospital statistics.

Most of the reports are hand-written. Only two typewriters are available in the CMHO's office (Tikamgarh).

The districts' management has very poor communication facilities. Usually there is only one telephone available with the CMHO office, and there is no concept of intercom facilities. In the case of Damoh district, there is only one CHC with a phone. This severely affects the ability of the HMIS personnel to obtain, query, and validate information from blocks.

(3) Nominal Disease Surveillance

The district acts as a mere post office in terms of disease surveillance. There is a tendency to under-report all figurers. The Table 7-14 is an example of the Tikamgarh district disease surveillance reports.

Table 7-14 Disease Surveillance Report in Tikamgarh

Type of sickness	Year 2000	
	Affected	Deaths
Cholera	0	0
Diarrhoeal	607	0
Brain fever	12	0
Whooping cough	100	0
Tetanus	8	0
Jaundice	19	0
Malaria	460	0
Others	0	0

Note: This is an old reporting format. From the year 2001 they have adopted a new and lengthy form, which lists 18 diseases and from which data is yet to flow in.

Many times the cumulative figures are zero, which would not be the case in normal circumstances.

The HMIS at the district level is highly fragmented. A separate functionary handles each function. The programmes are different, family welfare and immunisation is again different, one more clerk looks after disease surveillance. The vital statistics are handled by an entirely different department, i.e., the District Statistical Office.

Discontinued old formats being followed

Some formats have been discontinued, but they are still being sent to the districts because the staff at the blocks have not been informed of the change. For example, in Damoh, "The Family planning methods and usage time" report is still being received in January 2001 from the Jabera block, though the report has been discontinued for long time.

Some reports like "The number of IUD units and the performance statistics " are being sent despite the information being available in the CNA forms.

CSSM reports have been discontinued, but Damoh district continues to procure them from all the blocks.

Lack of co-ordination with the Woman and Child Development Department.

The district Woman and Child Development Department handles a major project – the Integrated Child Development Scheme (ICDS). The department has grassroots workers in each village (Anganwadi workers) and a hierarchy of officers up to the state level. The ICDS programme generates a lot of statistics related to the women and children, but there are few linkages between the Health and Woman and Child Development Departments to share the information on a regular basis. The CMHO and the Dt. Woman and Child Development officer are on a couple of district level committees, but the statistical and programme officers have no formal interaction and information-sharing mechanism, though some kind of informal interaction occurs at the village/SC level.

(4) Sub-centre (SC) Level Issues

The area of SC (usually 4 to 5 villages and a population of around 5000) generally can be covered by two personnel, who deliver basic family welfare services, provided they stay at /attend the SC on a regular basis. But the ANM is overloaded with many programmes, different required formats, and the present CNA process. A brief look (Table 7-15) at the registers the incumbent has to maintain reveals the kind of programmes/tasks (s)he must attend to.

Table 7-15 SC registers

1	Eligible couples
2	Immunisation and ANC
3	Stock register
4	Family planning methods – stock and distribution
5	Referral registration
6	Registration of marriage, birth, deaths, ANC
7	Malaria surveillance
8	Water purification/ wells
9	Out patient statistics
10	Meeting register
11	Delivery register
12	School health register
13	Daily diary

Printed registers are in very short supply. So the health personnel use regular ordinary paper and draw the lines to fill in the data. In the process they fill up very little information about the households.

Performing SCs, usually have most of the registers up-to-date, but the ones that do not perform in the field do not maintain any registers.

The ANM has to receive support and guidance from the sector supervisors for service delivery and report preparation. But the support from and monitoring by the sector supervisors is very limited. There are 50 ~ 60 sector supervisors in each district, but their ability, and willingness to motivate and help the ANM is well short of the requirement.

(5) Issues Pertaining to All the Three Levels (State, Districts and Block)

1) Only aggregates and not details at each level

Planning and monitoring of health care services require comprehensive details at all levels about the performance of a chain of institutions. But at present only aggregates are made available to each higher level. The system of sending aggregates in manual formats has an inherent disadvantage. The individual institution's performance, or lack of it is, concealed in the aggregates/summaries. For example, there would not be much difference in the performance of a district from month to month and year to year. It may vary marginally. But the performance of an individual SC, PHC or CHC may vary based on the inputs and kind of leadership that is available. It is left to the next higher institution (a block in case of a PHC and a district in case of a block) to evaluate the performance of the institutions below. In case the block medical officer overlooks (which is usually the case) problems, there is no check above. The information disappears into aggregates. The under-performing PHC or CHC does not stand out in the district level aggregates, and a under-performing block will not stand out at the state level.

2) Absence of feedback defeats the purpose of information collection

The information collected from the PHCs in never fed back to them after processing. It is just supplied to the top tiers of the administrative hierarchy. This affects the willingness of the PHC to correct a problem. They are never clear about either the relative position of their PHC in comparison with the others or their standing in the national programme implementation. Feedback is the right way of ensuring conformity to the norms of service delivery, and it also builds a sense of responsibility and ensures data reliability. Since no information is ever fed back to the lower levels of service delivery, they assume that whatever they fill in just disappears into a black hole. The whole process of reporting is reduced to a ritualistic way of sending some data upwards.

This one-way system of reports constantly travelling upwards has one more limitation. Usually the district is supposed to know more about the demography, sociology, and economic aspects of the population through several surveys and state-level research inputs. This information is rarely passed down the system. If this information is passed on to the PHCs and it is suggested to them that they use the information or update the information, it gives them a clear sense of direction.

For example, in Damoh and Tikamgarh districts of MP in the 12 months January – December 2000 there were no reports to any PHC providing any feedback to them. The PHCs are also disinclined to ask for feedback lest it create a problem for them in case of under-performance.

Unfortunately the same practice is observed with the Donors and major NGOs. There is hardly any feedback to the system with comments or correction and valid data. The one way flow of information from government to the donors is depicted in Figure 7-5.

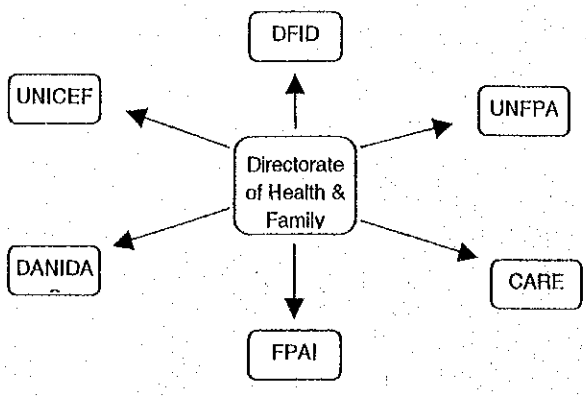

Figure 7-5 Information flow between MP Government and Various Agencies and NGOs in MP

3) Nominal system of monitoring

There are many supervising officers in the chain of health care delivery.

(Sector supervisor ⇒ PHC medical officer ⇒ Block medical officer ⇒ different programme officers ⇒ CMHO) But most of them do not systematically monitor the services delivered in terms of their visits to the PHCs and SCs. They cite various reasons for not making visits. Monthly meetings are held with a fixed order, and the minutes of the meeting are prepared regulary but not conveyed to the staff involved.

Schedule of meetings:

- Sector meetings (4 to 5 SCs) – once in a fortnight
- Block PHC (all PHCs and SCs) – once in a month
- District meetings (all blocks and district level officers) - once in a month
- State-level meeting (all districts) – once in every quarter

The inspection roster is systematically prepared and it lists the units/districts/hospitals every supervising officer has to visit each month and checklist of items under his/her supervisor. The roster is mandatory for officers of all cadres up to the block medical officer, but it is followed more in violation than in conformance.

The issues that have been discussed in the preceding paragraphs have been presented in a different format (HMIS life cycle format) for better understanding in Table 7-16.

Table 7-16 HMIS Life Cycle and the Issues

Stage	The present process or flow	Issues and comments
GENERATION OF DATA	SC ANM yearly household survey and regular updating.	Incomplete, but ritualistically followed at all the levels including SC, PHC, and summarising at the District level.
ANALYSIS OF DATA	ANM, PHC MO, District and state level officers	As the information available at the higher levels is in terms of aggregates, little analysis can be undertaken.
FLOW OF DATA	Monthly, usually hand delivered. CNA data is on NICNET from district to the state and centre.	Usually the deadline for reports is adhered to. Again it is a one-way flow and the information continues to travel upwards.
PRESENTATION OF DATA	In the review meetings.	Only tabular formats are used. Rarely are graphs and other aids utilised.
QUALITY CONTROL	No concept. Sometimes higher ups pass on oral remarks.	Glaring issue, most of the data is not validated. Sometimes the figures are abnormal.
USE OF DATA FOR DECISION MAKING	Programme planning, monitoring, training, logistics of drugs, personnel deployment, and facilities management.	The excessive concentration of decision-making powers in the directorate/secretariat makes the data redundant and unwarranted at the district and PHC levels. They cannot link any action to the data. Usually objectivity in decision-making is not the criterion at the higher levels.
FEEDBACK	Minutes, meetings, memos, and oral messages.	Formal/written feedback is completely absent at all levels. Sometimes oral feedback is communicated during the meetings.

7.3 VITAL STATISTICS (POPULATION INFORMATION SYSTEM) PRESENT SYSTEM AND ITS EVALUATION

7.3.1 Vital Statistics Scenario in India

Vital statistics (birth and death information) form the basis of planning for key social services. Health and Family Welfare services' planning is based on actual/accurate data on the births and deaths. But the completeness of the vital data in India is less than 50%, and it varies considerably between different states (Table 7-17). MP falls in the average category while the registration system in some states like Kerala is almost 100% complete. Since the data generated through this civil registration system is incomplete and not timely, it has contributed little to the planning process. To meet the needs of the planners in social sectors, a system of sample registration (SRS) has been introduced and continued. (Explained in detail in the 7.2.1 (1), 3)

Table 7-17 Coverage of the Civil Registration System in India

State	% of Births registered	% of Deaths registered
Kerala	100.0	89.3
Tamilnadu	90.8	75.5
Gujarat	96.3	69.0
MP	48.8	58.4
Bihar	17.4	24.1

Note: The rest of the states have average registration completeness except small city-states and some north-eastern states, which have high coverage. [1]

Many factors influence the completeness of registration of births and deaths. The percentage of institutional deliveries, educational enrolment, literacy, social awareness, and administrative efficiency are the key factors. The following pages explain the present system, the proposed changes, problems with the system, and comments and suggestions. Figure 7-6 outlines the vital statistics information flow from the village to the state capita,l while Figure 7-7 explains the present system of vital statistics collection.

[1] Source: Minutes of the All India conference on civil registration 11th September 1998.

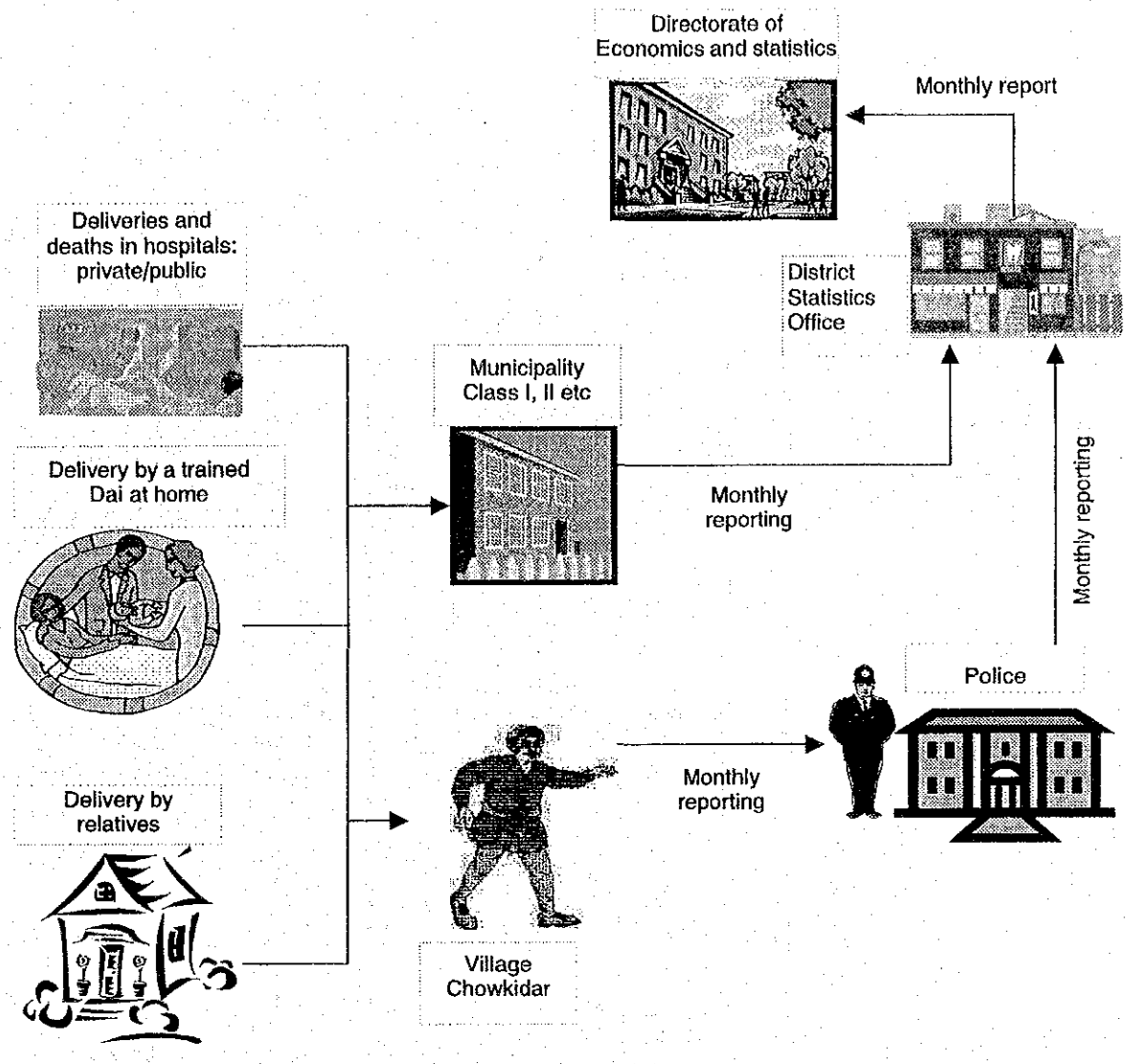

Figure 7-6 Present System of Reporting Births

The village Chowkidar is the principle informant in the village, the others including the Dai and sometimes the ANM. The Chowkidar fills in the forms and submits them to the block police station once in a month. (In the new system, different coloured forms with triplicate cut-sheets are used. One sheet is to be given to the informant, one retained at the village and the last to be passed on to the higher levels.) The police constable in charge of the records compiles them (usually with the help of some literate Chowkidar) and forwards the reports and forms to the district statistical office. At the district the Asst. Statistical officer in charge of the vital statistics *compiles them and forwards the entire set of forms to the headquarters in Bhopal. The vital* statistics department in Bhopal compiles the summaries and forwards them to the Registrar General of India in Delhi on a monthly basis.

The Govt of MP has proposed some major changes to the existing system. The Panchayat system has to play the key role in the proposed system with the active collaboration of the village-level functionaries of other departments like Health, Woman and Child Development, Education, etc. (explained in figure 7-7)

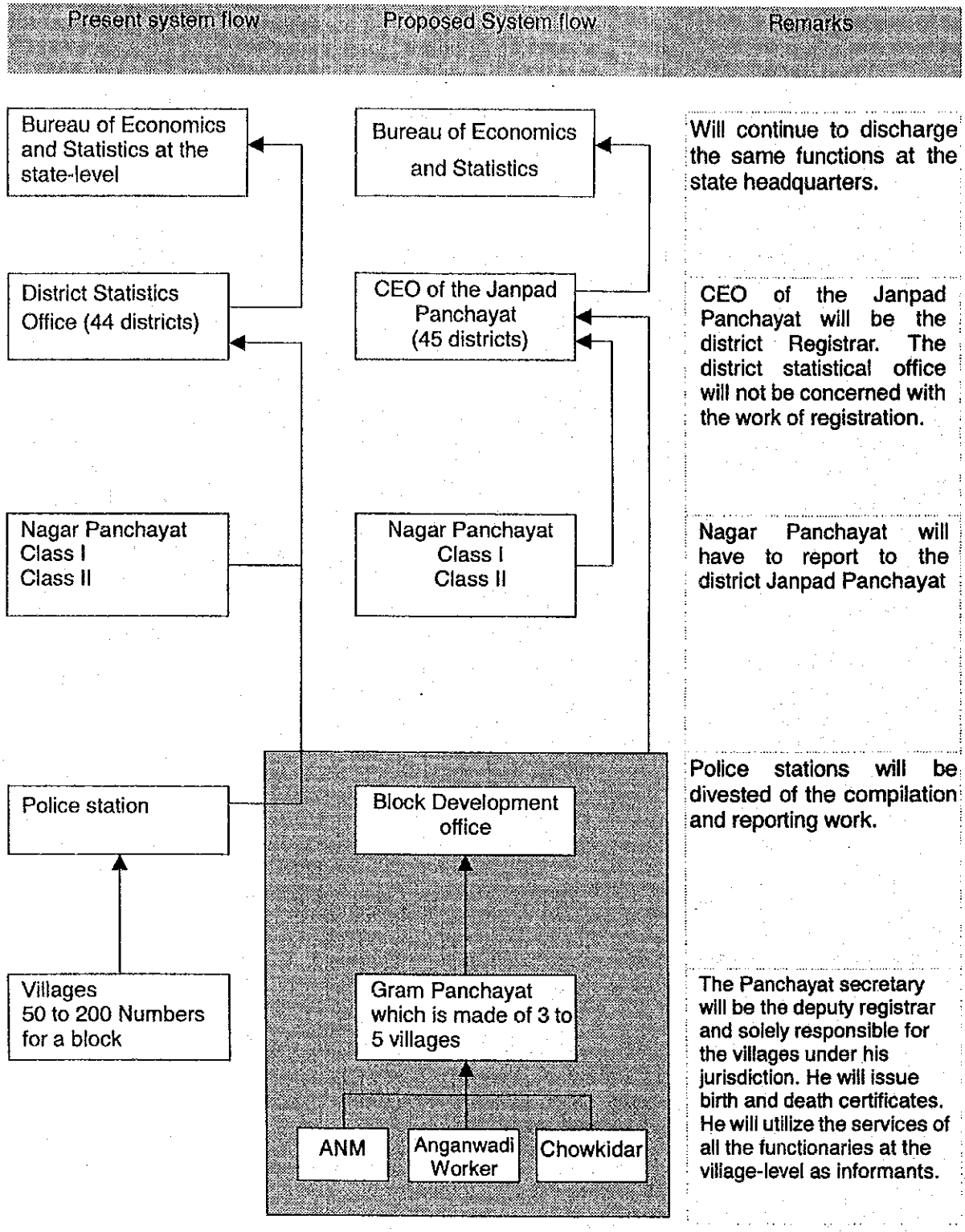

Figure 7-7 Proposed New System of Civil Registration Through the Janpad Panchayat (Implementation has been withheld for the time being)

7.3.2 Recent Initiative in Improving the Coverage of Registration

(1) New Forms for Registration

Earlier both birth and death information used to be recorded in registers (long bound). Now a new system has been introduced wherein there are separate forms with different colour coding for Birth, Death and Stillbirth. The form has three parts. The first part is issued to the informant, duly stamped by the village Chowkidar or urban local body clerk. The second part is retained by the registering unit, and the third part, which contains statistical information, is sent to the district statistical office. The district statistical office, after compiling and generating the reports, sends the forms and report to the state-level directorate of economics and statistics for state-level statistical compilation.

(2) Citizen Charter

A Citizen Charter has been framed and displayed at the police stations and the offices of the urban local bodies. It contains information regarding the time frame for the issuing of certificates on birth, death, etc. and it enables the citizens to know the procedures and their rights.

(3) District-level Co-ordination Committee (DCC)

The DCC under the chairmanship of the superintendent of police, with district-level officers (CMHO, Woman and Child Development officer, Panchayat executive officer, District education officers) as members has been constituted. They have already conducted one meeting with the district level teams, inclusive of the village Chowkidars. The importance of vital statistics and the need for registration of all cases has been conveyed to the village Chowkidars and other functionaries.

(4) Computerised Statistical Information System (SIS) Developed under ADB Supported Public Policy Programme

The SIS is envisaged as a statistical database capable of addressing the information needs of planners at the Panchayat and district levels. It aims to generate data relating to all the developmental and social departments in the district. It provides for various data entry formats and reports. The co-ordinating agency is the Directorate of Economics and Statistics at the state level and the implementing agency is the District Statistics Office at the district level. The unit of SIS is a village or urban local body. Large numbers of variables are included in the current version. More and more variables can be added as usage develops and the data is made available.

The SIS system has provision to store information on health facilities – location, type and numbers - and entering data on birth and death, as provided in the new formats, and generating various reports. *(More details are given in the Supporting Report, E, Part 1,2)*

7.3.3 Issues and Comments

(1) Not a 100% Foolproof System

Only about 50% of the births and 60 to 70 % of the deaths are being recorded in MP.

Unfortunately the statistical trends show a decline in registrations in the Sagar division (Table 7-18). This is contrary to the general increase in the awareness (This claim is made by the officers).

Table 7-18 Vital Statistics – Coverage in the Sagar Division

District	1990		1995		1999	
	% births registered	% deaths registered	% births registered	% deaths registered	% births registered	% deaths registered
Chhatarpur	34.99	38.90	29.86	36.06	32.01	37.90
Damoh	62.95	75.40	58.36	74.19	57.04	66.06
Panna	30.96	33.85	27.50	28.37	28.79	38.99
Sagar	61.91	68.89	57.45	65.20	51.46	60.05
Tikamgarh	27.75	34.39	25.11	29.07	32.23	40.53

Source: Directorate of economics and statistics, vital statistics section

Awareness about the registration of death has been increasing, as there are now certain state government schemes that offer Rs. 5000 compensation for the death of the wage-earning family member. The birth certificate was made compulsory for school admission in the year 1998. But public protest forced the government to cancel the requirement of the birth certificate for school admissions.

Even these incomplete records are compiled very slowly and at any given time they lag by at least one year. In the district of Tikamgarh, the processing for June 2000 was being done in the month of Feb 2001.

(2) Chowkidar

The system of registration through the village Chowkidar is age old and has many inherent problems.

He is mostly illiterate (more than 90%) and the new form is very comprehensive and lengthy.

It is very difficult to cover the area (usually 3 to 4 villages) allocated to one Chowkidar. He is only a part-time employee, who is paid a meagre salary of Rs.125 a month. (In Tikamgarh district there are only 295 Chowkidars for 973 villages)

(3) Police Station Compilation Problems

Each police station covers a large number of villages (nearly 150 to 200). There is only one constable earmarked for record keeping. He has to attend to general security duties also. The constable is not very educated, mostly matriculated, or he may be a little more qualified. It is difficult for him to validate the information in the registration form. He simply passes the forms on to the district Statistical office.

Nagar Nigams are unable to cover the large population

Each Nagar Nigam has a huge population to be covered, somewhere around 100,000. In most cases the informants have to visit the Nagar Nigam office to register.

(4) Late Hospital Submission of Reports

Most of the hospitals, both government and private, do not comply with provisions for reporting their births and deaths. For example, out of 24 institutions (1 district hospital, 5 CHCs and 18 PHCs) in the Tikamgarh district, only 11 report some figures, while the rest do not report any figures for years together (Table 7-19). It is interesting that even in cases where they are located

in same or adjacent buildings like the Lethora block in Tikamgarh district, the CHC does not report the vital statistics. Even the district hospital in Tikamgarh does not dispatch the statistics on a regular and timely basis.

Table 7-19 Tikamgarh District - Number of Births Reported by the Institutions

Sr. No.	Name of the hospital	No of births reported		
		1990	1995	1999
1	Dist. Hospital -- Tikamgarh	990	659	1,551
2	Sewa Nursing Home -- Tikamgarh		102	227
3	CHC Jatara		12	15
4	CHC Printipura	19	571	1,011
5	CHC Nivari	4	693	501
6	CHC Badagaon	27		32
7	CHC Paleru	43		
8	PHC Khargatra	23		
9	PHC Orchha	2		

(5) Limited Role of the District Statistical Officer as Registrar

The district registrar is not required to spread awareness and educate the general public with regard to birth and death registration. He is only a consolidating agency. He does not have any administrative powers over the various constituents who are reporting or not reporting the vital statistics. They rarely, if ever, inspect each reporting unit.

(6) Insufficient Funds for Stationery, Field Visits

Meagre budgets for stationery and other items hamper timely compilation of reports. Minor maintenance costs relating to printing or computer operations are not provided for in the regular system.

7.3.4 Problems with the New System

The new forms have been printed on such low quality paper that it will be very difficult to preserve the forms for long. The registration data from the forms is supposed to be entered at the Directorate of Economics and Statistics in Bhopal, but due to the non-availability of computers for this task, the entire process of data compilation has been delayed for the last year. In fact, very few statistics have been compiled from the comprehensive registration forms.

(1) Computer and Software Available but Not Utilised

Computers were supplied to the district statistical office a year ago. Unfortunately, for the last year or so, the data entry of vital statistics has not been undertaken in any of the districts for various reasons. The district statistical officer and the concerned ASO have been given training on data entry and report generation, but most of them do not operate the computer. While Tikamgarh has printed some formats and done some word processing, other districts in the Sagar division seem to be not even doing that much. The concerned officers feel that it is the job of a computer operator, who is yet to be recruited.

7.4 GEOGRAPHICAL INFORMATION SYSTEM (GIS) IN HEALTH

Though GIS has been extensively employed in the last 5 years in India in sectors like environment and forestry, efforts to employ it in the health and family welfare sector have just started picking up. A few organisations like DANIDA have made a commendable beginning. The situation has to do with the usage of computers in the health and family welfare sector in general and availability of databases on facilities, indicators, etc. in particular.

7.4.1 Some Key Issues Related to Health GIS in India

(1) Absence of Leadership

Some key issues related to Health GIS in the Indian family welfare sector share the same problem of computer usage. Usually an enthusiastic officer pioneers the efforts. After he is transferred to another position, the development efforts take a back seat, and GIS personnel, equipment, and infrastructure developed during the predecessor tenure are dislocated and assigned to other tasks or lie unused.

Absence of databases: In India where the population is heterogeneous, and ethnic, religious and socio-economic differences influence illness concepts and demands for health care, the only information available on the local population is the Census of Population, which is conducted every 10 years. But even this does not coincide with the catchment area of the health facilities. The health information system (HMIS) should reflect these circumstances, but available data are incomplete and mostly about care-seeking clients and their service statistics. A need exists for a more precise and complete description of the population and health situation served by each health centre. Information at the village, community, and division levels needs to be mapped.

Technical capability and issues of boundaries: Unlike other GIS users, Health GIS users (medical practitioners to a large extent) are relatively new to the concept of computer mapping. Though the field staff (at the PHC level) have their own hand-drawn, not to-scale, mapping system, its applicability as a management tool is limited due to its inability to integrate datasets and prepare combined maps for districts or states. The administrative divisions of health being different, the revenue maps (administrative maps) need to be modified for incorporating health boundaries. A PHC boundary is generally the most feasible administrative boundary for a national-level health GIS.

(2) Data Sharing

Health being a humanitarian subject, all other projects that have developed digital maps should share their data sets for health mapping purposes. DANLEP has already set up a commendable example in this respect by sharing its data with other development projects. Further, health being an interdisciplinary subject, it needs input with regard to socio-economic, environment, and land use aspects. Such data generation is beyond the scope of any health sector programme and needs to be provided by the respective departments.

(3) Need for National Health GIS

It is time that India had a national Health GIS in place. GIS as a planning and management tool can substantially help in reducing the monitoring and implementation costs of health sector programmes. With the advent of Internet mapping, information and data dissemination have become much easier, facilitating the setting up of a "National Health GIS".

Studies of the geography of health need to adopt a welfare approach in order to improve the quality of life. In this context, the interplay of social, economic, and political processes in the inequality in health care services, the changing environment, and the resultant environmental hazards needs to be researched intensively to plan for effective health management strategies.

Table 7-20 Matrix Summarising the GIS Development in the Health and Family Welfare Sector

Activity	Description	Agency	Remarks
Development of GIS maps for health facilities and disease mapping.	The Mandal (20 to 30 villages – the smallest administrative unit) boundaries are mapped along with the health facilities.	Andhra Pradesh Government and Andhra Pradesh Vidya Vidhan Parishad.	Up to PHC level only. The locations of the facilities are not GPS based. It is simply assigned to the Mandal. The scaling of the map is 1:1000000.
Mapping of health facilities and block-level boundaries in three states.	The scale of the maps is 1: 250000. Up to SC level the facilities are mapped. The road, rail and drainage network mapping is very useful.	DANLEP (DANIDA Leprosy project) Orissa, MP, Tamilnadu	Pioneering effort in the health sector. DANLEP's experience suggests that GIS can be very helpful in designing campaigns, IEC activities, integration studies, and awareness programmes. It is observed that leprosy and TB are endemic in tribal areas. Studies in relation to poverty level, tribal settlements, and accessibility have helped in optimising location and reallocation of service delivery centres. DANLEP has undertaken studies to identify health hotspots by studying disease profiles across Orissa for multiple diseases. Most of the maps are not geo-referenced in the sense that distance calculations are not possible.
Block-level boundaries of India CHILDINFO database	The block-level indicators are obtained from the state governments on a regular basis and used to develop the maps. Usually the district-level and state-level maps are used.	UNICEF	There are problems in collecting the data from the states. The staff is well aware of the GIS capabilities and have plans to harness it.
Health Atlas of India	National-level effort and part of the national atlas of India. 1:100000 scale is used. Number of disabled persons and the availability of hospital beds are plotted district-wise.	National Atlas and Thematic Mapping Organisation (NATMO), Calcutta	Very limited themes, such as availability of hospital beds, population at district level, etc. Incomplete data for nearly 40% of the districts.
Mapping of malaria vector in the costal areas	1:6000000 scale. But some areas like Orissa and Tamil Nadu were developed at a higher scale for analysis. Disease surveillance for one particular city in Tamil Nadu, Dindigul, was developed with ward-level and street level information. A training programme was developed for Tamil Nadu officers.	Malaria Research Centre, New Delhi	Pioneering work in one particular programme area. Plans to host it on the web.

7.4.2 Geographical Information Systems (GIS) in Other Sectors in MP

(1) Status of GIS in MP

Many government departments in the state of MP are using GIS. A brief description is provided below and more details of the project are available in the Supporting Report, E, Part 1, 3.

1) DANLEP (DANIDA Leprosy Project)

DANLEP has used GIS for their project and it is one of the major organisations in MP to apply GIS in the health sector. This project has information regarding health facilities, but only few SCs are covered in these maps, as only 60% of the total villages could be mapped. (See Supporting Report, E, Part 1, 3)

2) MP State Remote Sensing Application Centre

The MP the State Remote Sensing Application is the principal organisation in the state for GIS and Remote Sensing Applications established by the state Government and the Department of Space, Government of India. The centre is involved in GIS database creation and application development. They are developing detailed maps for all the themes and applications under the National Resource Information System (NRIS) project of the Department of Space. So far they can map detailed information for Datia district at 1: 50000 scale. Now the digital mapping of Sidhi is in progress, and it may take one more month for its completion. It took more than 2 years to complete the mapping and development of applications for these two districts. The combination of Survey of India topographical sheets, IRS 1C/1D remotely sensed data, and sample ground verification constitutes the inputs for this mapping, and the census data and field reports are used as attribute data. (See Supporting Report, E, Part 1, 3)

Implementation of the Rajiv Gandhi Underground Water Mission Project has also been undertaken in some of the areas of the state. Under this project, groundwater potentiality and hydro-geomorphology are the derivatives. Mapping of the roads, drainage, geology, and geomorphology is on-going. The roads and water bodies are mapped from the topo-sheets and they are updated with the help of Remote Sensing Data. This project has been carried out for some areas in MP. (See Supporting Report, E, Part 1, 3)

The other project carried out at MPSRAC is wasteland mapping.

3) Regional Research Laboratories (RRL)

RRL is using GIS for their research studies. They have recently undertaken the survey of a few villages for detailed information under the UNDP- DST-GOI TDC-TRC Network Project. This survey aims to map detailed spatial information, including road networks, houses, agricultural lands, slope, landmarks, drainage, etc. at 1:4000 scale, apart from the attribute data. But this project covers only few villages of Damoh, and the data is confidential as the project is under implementation and the data has not yet been published. (See Supporting Report, E, Part 1, 3)

4) Indian Institute of Forest Management (IIFM)

IIFM is basically a training institute and is carrying out GIS & Remote Sensing projects for research. It is developing the methodology for better usage of GIS for monitoring the forests. It undertakes projects for other state forest departments on a commercial basis. It has developed a project for the Vidhisha district of MP to map forest stock and density. They used Erdas Imagine and ArcInfo software for this project. No application has been developed with this database.

5) MP Forest Department (MPFD)

The MP forest department was the first department to take the initiative to apply GIS in governmental activities, but unfortunately it could not sustain the momentum. MPFD has been using Caris software for GIS and Easi/Pace for image processing. Now no GIS activity is taking place in MPFD as the present work has been transferred to Chhattisgarh state. So far MPFD has developed the Forest Digital Database for the Raisen, Vidhisha and Chindwara districts through outside agencies. (See Supporting Report, E, Part 1, 3)